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### (54) INK FOR INK JET RECORDING AND DEVICE FOR INK JET RECORDING

#### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain the subject ink composition giving high printing quality and reliability to plain paper, reclaimed paper and exclusive paper having an ink-receiving layer on the surface by including a specific pigment, a water-soluble organic solvent, an acetylene glycol-based surfactant and water.

SOLUTION: This ink for ink jet recording comprises (A) a pigment obtained by treating the surface of carbon black preferably having an average particle diameter of 50-200 nm as a main component so as to bind at least one kind of functional groups selected from carboxyl groups, carbonyl groups, hydroxyl groups and sulfonyl groups or their salts to the surface of the carbon black and thereby so as to be dispersible or dissolvable in water without requiring a dispersant, preferably in an amount of 2-10 wt.%, (B) a water-soluble organic solvent such as glycerol, diethylene glycol, 1,5-pentanediol or thioglycol, (C) an acetylene glycol-based surfactant preferably in an amount of 0.3-2.0 wt.%, and (D) water.

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CLAIMS

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[Claim(s)]

[Claim 1] The ink constituent whose aforementioned surfactant the aforementioned pigment is a pigment in which distribution and/or the dissolution are possible without a dispersant at water coming [ a pigment, the water-soluble organic solvent, a surfactant, and water ] at least, and is an acetylene glycol system surfactant.

[Claim 2] The ink constituent according to claim 1 made without a dispersant into the thing in which distribution and/or the dissolution are possible by surface treatment at water so that a kind of functional group that the front face has few aforementioned pigments as for a carbonyl group, a carboxyl group, a hydroxyl, or a sulfone machine, or its salt may join together.

[Claim 3] The ink constituent according to claim 1 or 2 with which the aforementioned pigment makes carbon black a principal component.

[Claim 4] An ink constituent given in any 1 term of claims 1-3 whose aforementioned pigment is what has 50-200nm of mean particle diameters.

[Claim 5] An ink constituent given in any 1 term of the claims 1-4 which come to contain the aforementioned pigment two to 10% of the weight.

[Claim 6] An ink constituent given in any 1 term of the claims 1-9 which come to contain the aforementioned acetylene glycol system surfactant 0.3 to 2.0% of the weight.

[Claim 7] An ink constituent given in any 1 term of the claims 1-6 which come to contain a water-soluble emulsion further.

[Claim 8] An ink constituent given in any 1 term of claims 1-7 which is the thing in which the aforementioned water-soluble emulsion comes to contain the resin which makes an acrylic acid and/or a methacrylic acid a principal component.

[Claim 9] An ink constituent given in any 1 term of claims 1-8 which is the thing which comes to contain the resin particle of the core-shell type structure where the aforementioned water-soluble emulsion consists of the core section and the shell section which surround it.

[Claim 10] The ink constituent according to claim 9 which the aforementioned core section consists of an epoxy resin, a urethane resin, an acrylic acid resin, and/or a methacrylic resin, and consists of a resin which has the front face where the shell section has the carboxyl group of an acrylic acid and/or a methacrylic acid.

[Claim 11] The ink constituent according to claim 9 or 10 whose resin of the core section is what has the structure of cross linkage.

[Claim 12] An ink constituent given in any 1 term of claims 1-11 whose aforementioned water-soluble organic solvent is a kind or two or more things which are chosen from a glycerol, a diethylene glycol, 1, 5-pentanediol, and the group that consists of a thiodiglycol.

[Claim 13] An ink constituent given in any 1 term of the claims 1-12 which come to contain 2-pyrrolidone further.

[Claim 14] An ink constituent given in any 1 term of the claims 1-13 which come to contain a triethanolamine further.

[Claim 15] An ink constituent given in any 1 term of claims 1-14 whose pH is 7-11.

[Claim 16] An ink constituent given in any 1 term of the claims 1-15 which come to contain a potassium hydroxide further.

[Claim 17] The method are the record method of making an ink constituent adhering and printing to a record medium, and using an ink constituent given [ as an ink constituent ] in any 1 term of claims 1-16.

[Claim 18] The ink-jet record method are the ink-jet record method of breathing out the drop of an ink constituent and printing by making this drop adhering to a record medium, and using an ink constituent given [ as an ink constituent ] in any 1 term of claims 1-16.

[Claim 19] The record object in which record was performed by the method according to claim 17 or 18.

[Claim 20] The ink-jet recording device to which it is the ink-jet recording device which comes at least to have the ink-jet formula recording head equipped with nozzle opening which carries out the regurgitation of the ink drop on the record medium, an ink container, and an ink supply means for supplying an ink constituent to the aforementioned recording head from this ink container, and the aforementioned ink container comes to contain the ink constituent of a publication in any 1 term of claims 1-16.

[Claim 21] The ink-jet recording device according to claim 20 to which the aforementioned ink container comes to have an urethane foam into it.

[Claim 22] The ink-jet recording device according to claim 20 or 21 whose nozzle side of the aforementioned recording head is the thing it comes to give eutectoid plating with a polytetrafluoroethylene and a metal to.

[Claim 23] An ink-jet recording device given in any 1 term of the claims 20-22 which are further equipped with the means which carries out the regurgitation of the color ink constituent, and come to have a means to print the aforementioned color ink constituent and to print the ink constituent of a publication on it at any 1 term of claims 1-16 when printing to the record medium which has an ink absorbing layer.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

#### Background of the Invention]

The field this invention of invention especially relates to various record media and the ink-jet record ink in which a high quality of printed character and high reliability are acquired to a regular paper, recycled paper, and the exclusive paper that has an ink absorbing layer on the front face further.

[0002] Background technical ink-jet record is the method of breathing out ink as a globule from a detailed nozzle, and recording a character and a figure on a recorded body surface. An electrical signal is changed into a machine signal, using an electrostriction element as an ink-jet recording method. How to breathe out intermittently the ink stored in the nozzle head portion, and record a character and a sign on a recorded body surface, The part very near a regurgitation portion is quickly heated for the ink stored in the nozzle head portion, a bubble is generated, it breathes out intermittently by cubical expansion with the bubble, and the method of recording a character and a sign on a recorded body surface etc. is put in practical use.

[0003] Properties, like that the drying property of printing is good, that there is no bleeding of printing, that it is uniformly printable to various recorded body surfaces, and in a multicolor case, a color is not mixed are demanded of the ink used for such ink-jet record.

[0004] the case where paper is used for becoming especially a problem as the recorded body here — permeability — \*\* — it is that that mainly originate in fiber being intermingled and bleeding arises, black ink and color ink carrying out color mixture on the boundary, and reducing quality of image, and the ink that rode on the recorded body exfoliate when a hand etc. touches etc.

[0005] In order to conquer these disadvantageous points, various ink constituents are proposed.

[0006] For example, in JP,2-2907,B, it considered as the wetting agent, and use of the water-soluble organic solvent is proposed in JP,1-15542,B, and use of a color dissolution accelerator is further proposed for use of a glycol ether by JP,2-3837,B.

[0007] Moreover, in order to raise permeability on U.S. Pat. No. 5156675 specifications, addition of both the diethylene-glycol monobutyl ether and SAFI Norian 465 is further proposed for addition of SAFI Norian 465 whose addition of the diethylene-glycol monobutyl ether is the surfactant of an acetylene glycol system at a U.S. Pat. No. 5183502 specification by the U.S. Pat. No. 5196056 specification. Here, a diethylene-glycol monochrome-n-butyl ether is also called butyl carbitol, for example, is indicated by the U.S. Pat. No. 3291580 specification. Or use of the ether of a diethylene glycol is considered by the U.S. Pat. No. 2083372 specification. Furthermore, in JP,56-147861,A, the combined use with a pigment and the triethylene-glycol monomethyl ether is proposed.

[0008] However, an ink constituent which can realize a picture with little bleeding is still desired.

[0009] Moreover, in order to reduce bleeding, heating the recording paper is examined. However, when recording and the recording paper is heated, the technical problem that starting to the predetermined temperature of the heating unit in equipment takes time, the power consumption of the main part of equipment becomes large, or a damage is given to the recording paper and

other record media—ed occurs.

[0010] Moreover, in the ink constituent using the pigment, permeability is suppressed, osmosis of the ink in a record intermediation body surface is suppressed, and the attempt which secures a quality of printed character is made. However, if an ink constituent does not permeate into a record medium to some extent, a pigment remains in a record intermediation body surface, and scuff resistance may be worsened. Furthermore, the record medium which has a gloss layer on the front face, gives gloss to a record picture, and gives added value to a picture is used recently. Pigment system ink which can realize the picture which has good scuff resistance on such a record medium is desired.

[0011]

[Summary of the Invention] The ink constituent included combining a specific pigment and an acetylene glycol system surfactant suppressed bleeding effectively this time, and this invention person etc. acquired knowledge that the picture of the high quality excellent in scuff resistance is realizable. this invention is based on this knowledge.

[0012] Therefore, this invention sets offer of an ink constituent which can realize a good picture with little bleeding as the purpose also in various record media, a division regular paper, recycled paper, and the record medium that has a gloss layer on the front face further.

[0013] And the ink constituent by this invention is a pigment in which distribution and/or the dissolution are possible without a dispersant in the aforementioned pigment at water coming [ a pigment, the water-soluble organic solvent, a surfactant, and water ] at least, and the aforementioned surfactant is an acetylene glycol system surfactant.

[0014]

[Detailed Description of the Invention]

It is used for the recording method using the ink constituent by the ink constituent this invention. With the recording method using the ink constituent, the recording method by the writing implement with for example, an ink-jet recording method, a pen, etc. and various kinds of other printing methods are held. The ink constituent especially by this invention is preferably used for the ink-jet record method.

[0015] The ink constituent by this invention is a pigment in which distribution and/or the dissolution are possible without a dispersant in the aforementioned pigment at water coming [ a pigment, the water-soluble organic solvent, a surfactant, and water ] at least, and the aforementioned surfactant is an acetylene glycol system surfactant. According to the ink constituent by this invention, bleeding is suppressed effectively and the picture of the high quality excellent in scuff resistance can be realized. Furthermore, the ink constituent by this invention is excellent in the drying property of printing, and also has an advantage that the depth of shade is high. For example, the ink constituent by this invention is applicable also to the record method that it prints by dividing the amount of ink into two times or multiple times, and according to such a method, printing of higher concentration can be obtained.

[0016] Distribution and/or the dissolution are enabled without a dispersant at water by surface treatment which a kind of functional group that there are few a carbonyl group, carboxyl groups, hydroxyls, or sulfone machines, or its salt combines with the pigment preferably used in this invention on the front face. It can obtain by specifically carrying out the graft of the molecule containing the functional group or the functional group on the surface of carbon black by physical processing and chemical preparation of vacuum plasma etc. In this invention, even if the functional group by which a graft is carried out to one carbon black particle is single, the number of them may be [ two or more ]. It is easy to be determined by the kind of functional group by which a graft is carried out, and its extent suitably, taking into consideration the drying property in the distributed stability, the depth of shade, and the front face of an ink-jet head in the inside of ink etc.

[0017] In this invention, the state where the pigment exists without a dispersant underwater stably is expressed as "distribution and/or the dissolution." It is not few when it is difficult to distinguish clearly whether the matter is dissolving and whether it is distributing. If it is in this invention, as long as it is an existence \*\*\*\*\* pigment stably without a dispersant to underwater, the state cannot ask distribution and the dissolution but can use such a pigment.

Therefore, in this specification, although the pigment which may exist without a dispersant underwater stably may be called water-soluble pigment, a pigment does not mean eliminating to the thing in a distributed state.

[0018] According to the desirable mode of this invention, it is desirable to be used as pigment dispersion liquid which have ten or less degree of dispersion by 50–200nm of mean particle diameters.

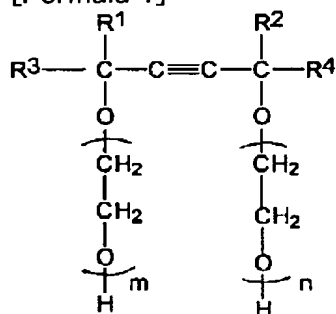
[0019] obtaining by the method given [ for example, ] in JP,8–3498,A has obtained the above-mentioned pigment preferably used in this invention Moreover, it is also possible to use commercial elegance as the above-mentioned pigment, and the micro jet 1 or CWs 2 by Orient chemical-industry incorporated company is mentioned as a desirable example.

[0020] The addition of the pigment to an ink constituent has 2 – 10 desirable % of the weight, and it is about 4 – 8 % of the weight more preferably.

[0021] As a desirable example of the acetylene glycol system surfactant used in this invention, the compound expressed with the following formula (I) is mentioned.

[0022]

[Formula 1]



(The inside of a formula,  $0 \leq m+n \leq 50$ , and R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are alkyl groups independently)  
 All [ 5-dimethyl-1-hexyne-3 / 2, 4, 7, the 9-tetramethyl-5-crepe de Chine -4, 7-diol, 3, the 6-dimethyl-4-octyne -3, 6-diol, 3, and ] etc. is especially mentioned preferably in the compound expressed with the above-mentioned formula (I). It is also possible to use commercial elegance as an acetylene glycol system surfactant expressed with the above-mentioned formula (I), and SAFI Norians 104, 82, 465, and 485 or TG (all are more nearly available than Air Products and Chemicals, Inc.) is mentioned as the example.

[0023] According to the desirable mode of this invention, the addition of an acetylene glycol system surfactant has 0.3 – 2% of the weight of a desirable range to the ink whole quantity, and is 1.5 or less [ 0.5% or more ] more preferably. A picture with more little bleeding is realizable because the addition of an acetylene glycol system surfactant is in this range.

[0024] In addition, for TG, a part of the acetylene glycol system surfactants 104, for example, above-mentioned SAFI Norians, solubility [ as opposed to / a low sake / water in HLB ] is a low. This solubility can improve by adding components, such as a glycol ether, glycols, and a surfactant, to an ink constituent.

[0025] The water-soluble organic solvent used in this invention is not limited, especially unless it forms the main solvent with water, it has compatibility with water and it has other components in an ink constituent, and the interaction which is not desirable.

[0026] In order to suppress dryness of the ink constituent in the front face of a nozzle of the head for ink-jet record as a water-soluble organic solvent according to the desirable mode of this invention Ethylene glycol, a diethylene glycol, a triethylene glycol, A tetraethylene glycol, a propylene glycol, a dipropylene glycol, Tripropylene glycol, a with a molecular weight of 2000 or less polyethylene glycol, 1, 3-propylene glycol, an isopropanal pyrene glycol, an isobutylene glycol, 1, 4-butanediol, 1, 3-butanediol, 1,5-pentanediol, 1, 6-hexandiol, a glycerol, a thiodiglycol, meso erythritol, a pentaerythritol, etc. can be added. Those mixture is especially still more desirable from the ability to control the viscosity of an ink constituent proper, prevent the blinding of a nozzle effectively, and raise [ a glycerol, 1,5-pentanediol, a diethylene glycol or a

thiodiglycol, and ] the cloud point of an ink constituent further. Furthermore, the solubility to the ink constituent of the above-mentioned acetylene glycol system surfactant (especially SAFI Norian 104, SAFI Norian TG) can be raised, and the advantage that phase separation of the ink constituent is not carried out to the bottom of an elevated temperature, either can also be enjoyed.

[0027] Although the addition of these water-soluble organic solvents may be determined suitably, its less than 1 – 30 % of the weight is desirable to an ink constituent, and it is about 5 – 15 % of the weight more preferably.

[0028] According to another desirable mode of this invention, as a water-soluble organic solvent which can be added to the ink constituent by this invention The alkyl alcohols of the carbon numbers 1–4, such as ethanol, a methanol, a butanol, propanol, and an isopropanol An ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, An ethylene glycol monobutyl ether, ethylene-glycol-monomethyl-ether acetate, The diethylene-glycol monomethyl ether, a diethylene glycol monoethyl ether, The diethylene-glycol monochrome-n-propyl ether, the ethylene glycol monochrome-iso-propyl ether, The diethylene-glycol monochrome-iso-propyl ether, an ethylene glycol monochrome-n-butyl ether, An ethylene glycol monochrome-t-butyl ether, a diethylene-glycol monochrome-n-butyl ether, A triethylene-glycol monochrome-n-butyl ether, a diethylene-glycol monochrome-t-butyl ether, 1-methyl-1-methoxybutanol, a propylene glycol monomethyl ether, The propylene-glycol monoethyl ether, a propylene-glycol monochrome-t-butyl ether, The propylene-glycol monochrome-n-propyl ether, the propylene-glycol monochrome-iso-propyl ether, A propylene-glycol monochrome-n-butyl ether, a dipropylene-glycol monochrome-n-butyl ether, The dipropylene-glycol monomethyl ether, the dipropylene-glycol monoethyl ether, Glycol ethers, such as the dipropylene-glycol monochrome-n-propyl ether and the dipropylene-glycol monochrome-iso-propyl ether A formamide, an acetamide, dimethyl sulfoxide, a sorbitol, sorbitan, a glyceryl monoacetate, a diacetin, a triacetin, a sulfolane, etc. are mentioned. Since addition of these organic solvents raises the solubility to the ink constituent of other components in an ink constituent, raises the permeability over the recorded body, for example, paper, further and can prevent the blinding of a nozzle effectively further, it is desirable. Although the addition of these organic solvents may be determined suitably, its about 0.1 – 60 % of the weight is desirable to an ink constituent, and it is about 5 – 15 % of the weight more preferably.

[0029] According to the desirable mode of this invention, the ink constituent by this invention has a desirable bird clapper including 2-pyrrolidone. Since the acetylene glycol system surfactant contained in the ink constituent by this invention is a non-ion system, the low cloud point may be given to an ink constituent. Addition of 2-pyrrolidone is effective in raising the cloud point, without being accompanied by extreme viscosity elevation. Although addition of 2-pyrrolidone may be suitably determined in the range from which the above-mentioned effect is acquired, it is less than 20 % of the weight more than per % of the weight to an ink constituent preferably.

[0030] As for the ink constituent by this invention, according to the desirable mode of this invention, it is desirable to come to contain a triethanolamine. By addition of this triethanolamine, an ink constituent can be made into proper alkalinity, and a moisturizincy effect can be given, and the blinding of a nozzle can be prevented effectively. Although the addition of TORIETANORUAMINO may be determined suitably, about 0.5 – 3 % of the weight is desirable.

[0031] The ink constituents by this invention are 8–10 preferably [ that the range of 7–11 controls the pH ], and more preferably. Since a pigment and the resin emulsion which carries out a postscript further can be made to exist in an ink constituent stably because pH sets in this range, it is desirable. Suitable alkali chemicals (for example, organic alkali and alkali-metal salts, such as ammonia) besides above-mentioned TORIETANORUAMINO can perform adjustment of pH. A potassium hydroxide is mentioned as desirable alkali chemicals. It is desirable to adjust pH especially combining a triethanolamine and a potassium hydroxide. When TORIETANORUAMINO and a potassium hydroxide are combined, the addition of a potassium hydroxide has about 0.01 – 0.2 desirable % of the weight.

[0032] As for the ink constituent by this invention, according to the desirable mode of this invention, it is desirable to come to contain a water-soluble emulsion. The fixing nature of

printing and scuff resistance are improvable with addition of this water-soluble emulsion. A continuous phase is water and this water-soluble emulsion has that desirable whose dispersed phases are an acrylic acid resin, a methacrylic resin, styrene resin, a urethane resin, an acrylamide resin, epoxy resins, or such mixed types. It is desirable that a dispersed phase consists of a resin which makes an acrylic acid and/or a methacrylic acid a principal component especially. These resins cannot be restricted depending on the mode of copolymerization, for example, they can be a block copolymer, a random copolymer, etc. As for the water-soluble emulsion furthermore used for the ink constituent by this invention, it is desirable that it is what has film organization potency and has a minimum film forming temperature below a room temperature preferably, and it is 20 degrees C or less in 0-degree-C or more temperature more preferably.

[0033] As for the resinous principle of a water-soluble emulsion, according to the desirable mode of this invention, it is desirable that it is the resin particle of the core-shell type structure which consists of the core section and the shell section which surround it. For example, composition that the resinous principle which can improve \*\*\*\*\* and fixing nature of ink is introduced into the core section and the resinous principle which makes a resin particle exist stably in an ink constituent at the shell section is introduced is employable. As for the core section, according to the desirable mode of this invention, it is desirable to consist of a resin which has the structure of cross linkage.

[0034] As matter which forms the core section, styrene, tetrahydrofurfuryl acrylate, Butyl methacrylate, alpha, and (2, 3 or 4)-alkyl styrene, alpha, and (2, 3 or 4)-alkoxy styrene, 3, 4-dimethyl styrene, alpha-phenyl styrene, a divinylbenzene, vinyl naphthalene, dimethylamino (meta) acrylate, Dimethylaminoethyl (meta) acrylate, a dimethylamino propyl acrylamide, N and N-dimethylamino ethyl acrylate, a bitter taste RIROI morpholine, N and N-dimethyl acrylamide, N-isopropyl acrylamide, N and N-diethyl acrylamide, methyl (meta) acrylate, ethyl (meta) acrylate, Propyl (meta) acrylate, ethylhexyl (meta) acrylate, Other alkyl (meta) acrylate, methoxy diethylene-glycol (meta) acrylate, The ethyl ester of a diethylene glycol or a polyethylene glycol, The acrylate (meta) of propyl ester or butyl ester, cyclohexyl (meta) acrylate, Benzyl (meta) acrylate, phenoxy ethyl (meta) acrylate, Iso BONIRU (meta) acrylate, hydroxyalkyl (meta) acrylate, fluorine-containing \*\* chlorinated, \*\*\*\*\* (meta) acrylate, an acrylamide (meta), a maleic-acid amide, etc. are mentioned.

[0035] moreover, the case (monochrome —) where the structure of cross linkage is introduced in addition to the above-mentioned acrylic acid (meta) JI, TORI, a tetrapod, poly ethylene GURIKORUJI (meta) acrylate, 1, 4-butanediol, 1,5-pentanediol, 1, 6-hexandiol, Acrylate, such as 1 and 8-octanediol and 1, and 10-Deccan diol (meta), TORIMECHI roll pro pantry (meta) acrylate, a glycerol (JI) TORI (meta) acrylate, bisphenol A, or the di(meth)acrylate of the ethylene oxide addition product of F, Neopentyl GURIKORUJI (meta) acrylate, pentaerythritol tetrapod (meta) acrylate, dipentaerythritol hexa (meta) acrylate, etc. can be used.

[0036] Moreover, the matter which forms the above-mentioned core section also in formation of the shell section can be used.

[0037] As an emulsifier used in order to form such a macromolecule particle, the sodium lauryl sulfate used commonly, a lauryl potassium sulfate, an anionic surface active agent, a nonionic surface active agent, and an amphoteric surface active agent can be used.

[0038] As a polymerization initiator, potassium persulfate, an ammonium persulfate, persulfuric-acid hydrogen, an azobisisobutyronitril, a benzoyl peroxide, a peroxidation dibutyl, a peracetic acid, cumene hydroperoxide, t-butyl hydroxy peroxide, and PARAMEN tongue hydroxy peroxide \*\*\*\* can be used.

[0039] As a chain transfer agent for a polymerization, t-dodecyl mercaptan, n-dodecyl mercaptan, n octyl mercaptan, the dimethyl xantho gene disulfide that is xantho genes, diisobutyl xantho gene disulfide, a dipentene, an indene, 1, 4-cyclohexadiene, a dihydrofuran, a xanthene, etc. can be used.

[0040] Moreover, according to the desirable mode of this invention, the core section consists of an epoxy resin or a urethane resin, and consists of a resin which has the structure of cross linkage preferably. Furthermore, according to another desirable mode of this invention, the core



section consists of an acrylic acid resin and/or a methacrylic resin, and consists of a resin which has the structure of cross linkage preferably. Moreover, as for the shell section, it is desirable that it is the structure of having the front face which has the carboxyl group of an acryloyl machine and/or a methacryloyl machine. Furthermore, as for the functional group of the front face of the shell section, it is desirable to come to be processed by organic alkali, such as an ammonium salt, an amine, and/or an amide salt, in order to make a resin particle exist stably in an ink constituent.

[0041] According to the desirable mode of this invention, the molecular weight of a water-soluble emulsion is 10,000 to about 100,000 preferably [ that it is 1000 or more ] and more preferably.

[0042] Z116 by Mitsui Toatsu Chemicals, Inc. can be mentioned possible [ also using commercial elegance as a water-soluble emulsion used in this invention ].

[0043] Although the addition of this water-soluble emulsion may be determined suitably, about 0.5 – 10 % of the weight is desirable, and is about 3 – 5 % of the weight more preferably, for example.

[0044] In addition to the above-mentioned component, the ink constituent by this invention can contain other components, for example, can add the blinding inhibitor of a nozzle, antiseptics, an antioxidant, a conductivity regulator, pH regulator, a viscosity controlling agent, a surface tension regulator, an oxygen absorbent, etc.

[0045] A saccharide can be added in order to suppress that ink dries the ink constituent by this invention in the front face of a nozzle. As such a saccharide, there are a monosaccharide and polysaccharide, for example, the alginic acid and its salt, the cyclodextrin, and the celluloses else [ , such as a glucose, a mannose, a fructose, a ribose, a xylose, arabinose, a lactose, a galactose, an aldonic acid, guru SHITOSU, a maltose, a cellobiose, a sucrose a trehalose, and a maltotriose ] can be mentioned. the addition — 0.05 % of the weight – about 30 % of the weight – – this — better — it is — \*\* More desirable additions, such as a glucose, a mannose, a fructose, a ribose, a xylose, arabinose, a lactose, a galactose, an aldonic acid, guru SHITOSU, a maltose, a cellobiose, a sucrose, a trehalose, and a maltotriose, are especially 3 % of the weight – 20 % of the weight. Since there is an inclination for viscosity to become high depending on the addition of an alginic acid and its salt, cyclodextrin, and celluloses, it is desirable to make the addition small.

[0046] Moreover, since permeability is further controlled in the ink which becomes this invention, it is also possible to add other surfactants. The surfactant to add has the good desirable surfactant of other components in an ink constituent, and compatibility, and what has it is desirable. [ high permeability and stable in a surfactant, ] As the example, an amphoteric surface active agent, a nonionic surface active agent, etc. are mentioned. As an amphoteric surface active agent, there are lauryldimethyl betaine aminoacetate, 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, a palm-oil-fatty-acid amide propyl dimethylamino acetic-acid betaine, another poliomyelitis KUCHIRUPORI aminoethyl glycine and imidazoline derivative, etc. As a nonionic surface active agent, the polyoxyethylene nonylphenyl ether, A polyoxyethylene octyl phenyl ether, a polyoxyethylene dodecyl phenyl ether, Polyoxyethylene alkyl aryl ether, the polyoxyethylene oleyl ether, The polyoxyethylene lauryl ether, polyoxyethylene alkyl ether, Ether systems, such as polyoxyalkylene alkyl ether, polyoxyethylene oleic acid, A polyoxyethylene oleate, polyoxyethylene distearic acid ester, Sorbitan laurate, sorbitan monostearate, sorbitan monooleate, There are fluorine-containing \*\* surfactants, such as ester systems, such as sorbitansesquiolate, polyoxyethylene monooleate, and polyoxyethylene stearate, other fluorine alkyl ester, and a perfluoroalkyl carboxylate, etc.

[0047] Moreover, for example as antiseptics and an antifungal agent, sodium-benzoate, pentachlorophenol sodium, 2-pyridine thiol-1-oxide sodium, sorbic-acid sodium, sodium-dehydroacetate, 1, and 2-JIBENJISO thiazoline-3-ON (pro cheating-on-the-fare XL- the pro cheating on the fare CRL of ICI, the pro cheating on the fare BDN, the pro cheating on the fare GXL, 2, pro cheating on the fare TN) etc. is mentioned.

[0048] moreover, as pH regulator, a dissolution assistant, and an antioxidant A diethanolamine, a triethanolamine, propanolamine, Amines, such as a morpholine, and those conversion objects, a potassium hydroxide, Mineral, such as a sodium hydroxide and a lithium hydroxide, an ammonium

hydroxide, The fourth class ammonium hydroxides (tetramethylammonium etc.), potassium carbonate, N-methyl-2-pyrrolidones, such as carbonic acid salts and other phosphate, such as a sodium carbonate and a lithium carbonate L ascorbic acid, such as biurets, such as aloha shirt NETO, such as ureas, such as a urea, thiourea, and a tetramethylurea, aloha shirt NETO, and methyl aloha shirt NETO, a biuret, a dimethyl biuret, and a tetramethyl biuret, the salt of those, etc. are mentioned. moreover, using a commercial antioxidant, an ultraviolet ray absorbent, etc. comes out, and Tinuvin 328, 900, 1130, 384, 292, 123, 144, 622, 770, and 292 of Ciba-Geigy, Irgacor 252 and 153, Irganox 1010, 1076, and 1035, MD1024, etc. are mentioned as the example It is also possible to use the oxide of a lanthanide furthermore.

[0049] Furthermore, as a viscosity controlling agent, rosin, alginic acids, polyvinyl alcohol, hydroxypropylcellulose, a carboxymethyl cellulose, a hydroxyethyl cellulose, a methyl cellulose, a polyacrylate, a polyvinyl pyrrolidone, gum arabic starch, etc. are mentioned.

[0050] The ink constituent by the record method and the equipment this invention may have a picture preferably formed of the ink-jet record method.

[0051] Drawing 1 is drawing having shown one example of the ink-jet recording device for which the ink constituent by this invention is used preferably. It comes to carry recording head 3a which the equipment in drawing has the carriage 2 which moves a guide shaft 2a top reciprocately in the direction of arrow B along with the platen 1 which is a recording paper conveyance means to rotate in the direction of arrow A in order to convey the recording paper, and it approaches this carriage 2 at a platen 1, and carries out the regurgitation of the black ink constituent, and recording head 3b which carries out the regurgitation of the color ink constituent, respectively. Above recording head 3a, the tank for color ink constituents is formed above tank 7 for black ink constituents a, and recording head 3b, respectively, and an ink constituent is supplied to recording heads 3a or 3b from each tank.

[0052] A signal is supplied to recording heads 3a and 3b from a signal cable 18, and the drop of an ink constituent is breathed out from recording heads 3a and 3b by the nozzle which is not illustrated according to this signal. It will adhere to the drop of the breathed-out ink constituent on the record medium 20 (for example, paper) twisted around the platen 1, and it will form a picture.

[0053] moreover, the case where blinding etc. arises in a recording head — a cap — a member 13 — the nozzle side of a recording head — closing — a cap — with the pump 15 connected with the member 13 through the conduit 14, operation of attracting an ink constituent is performed and blinding is canceled The attracted ink constituent is led to the waste fluid tank 17 with a conduit 16.

[0054] although one cap member is only prepared all over drawing — recording heads 3a and 3b — it may be alike, respectively, and you may prepare more than one so that it may correspond

[0055] Next, the tank for black ink constituents by this invention is explained in detail. Drawing 2 is drawing showing the cross section of the ink-jet recording device of drawing 1, and drawing 3 is the decomposition perspective diagram of tank 7a.

[0056] the upper part of recording head 3a — the interior — porosity, such as a polyurethane foam, — a member — \*\*\*\* — it comes to prepare tank 7a equipped with tank \*\*\*\*\* 6 which contained form 6a The exterior and the run through-hole 9 open for free passage are formed in the lid 8 at tank 7a, and the salient 10 of the shape of a base to which it was stuck with form 6a is formed in the base. There is the free passage section which turns caudad from the core of this salient 10, and is open for free passage to recording head 3a. The plug 12 which consists of elastic members, such as rubber, comes to form the free passage section in the edge of the ink room 11 which takes out and holds the ink constituent in form 6a, and the ink room 11.

[0057] the free passage which is open for free passage through recording head 3a and the filter room 4 which were established in carriage — by inserting in a plug 12 the hollow needle 5 which is a member, the ink constituent which sank in into ink tank 7a is supplied to recording head 3a

[0058] moreover, a free passage — closure of the non-permeability of a hole 9 which at least one can open — it is closed under reduced pressure by the member 21 just before use And it opens just before use and tank 7a and the exterior are open for free passage through air hole 9a. closure — as for a member 21, it is desirable for it to be constituted and to become so that it

may have a sufficiently long portion as shown in drawing 3 , and the edge may be picked up between its fingers and it can open easily Moreover, air hole 9a achieves during printing the part by which the tank was consumed, and the duty which fills up air in tank 7a.

[0059] According to the ink constituent by this invention, a good picture can be formed also in record media presupposed that it is easy to produce bleeding conventionally in comparison, such as a regular paper and recycled paper. Furthermore, the ink constituent by this invention can realize the picture which was excellent in scuff resistance also in the record medium which has the so-called gloss layer on the front face.

[0060] As for the front face of nozzle opening of a recording head, according to the desirable mode of this invention, it is desirable to consist of eutectoid plating with a tetrafluoroethylene and a metal. It becomes possible to lessen generating of the affix to a nozzle side by combining the recording head which has such a nozzle side, and the ink constituent by this invention. Moreover, even if an affix arises, these affixes can be easily removed by cleaning operation of contacting rubber or the felt.

[0061] The ink constituent by this invention can especially form printing of good quality at various record media in a regular paper, recycled paper, the exclusive paper that has an ink absorbing layer on the front face, especially the record medium which has a gloss layer further. In this invention, the record medium which has a gloss layer means the record medium which fixed white pigments on the base material using the binder. As an example, a colloidal silica, amorphous silica, and colloidal alumina, A boehmite, a pseudo-boehmite, an alumina, an aluminum hydroxide, a precipitated calcium carbonate, A heavy calcium carbonate, a calcium sulfate, a kaolin, talc, a barium sulfate, A rutile, a zinc oxide, zinc sulfide, a zinc carbonate, aluminum silicate, the diatom earth, The PIKUTORIKO type record medium which can apply and do ceramic particles, such as a calcium silicate, a magnesium silicate, a zeolite, a halloysite, a magnesium carbonate, and a magnesium hydroxide, and a colloidal particle in cast coated paper and the paper by the special method is mentioned. Moreover, it is the record medium which applied the resin layer which consists of a polymer or copolymers, such as a starch derivative, a carboxymethyl cellulose (CMC), a hydroxyethyl cellulose (HEC), casein, gelatin, polyvinyl alcohol, a polyvinyl pyrrolidone, melamine resin, a urea-resin, a urethane resin, an unsaturated polyester resin, a maleic-anhydride resin, styrene butadiene resins, an acrylic-acid derivative, and a methacrylic-acid derivative, etc. on the base material, and was formed, and the swollen type record medium swollen in ink is mentioned. Moreover, as a method of producing gloss, applying a resin with the pressure-welding dryness by the heating mirror plane in calender processing, the cast method, and a \*\*\*\* state and a feeling of gloss is mentioned. If it is in the record medium which has these gloss layers, the fixing nature of a pigment may get worse with the size of the opening of the front face. According to the ink constituent by this invention, it is not based on the state of such a record intermediation body surface, but the picture excellent in scuff resistance can be realized.

[0062] The ink constituent by this invention may be used for forming a color picture combining other ink constituents. According to the desirable mode of this invention, the combination which uses the ink constituent by this invention as black ink, and uses other ink constituents as color ink (for example, yellow ink, Magenta ink, cyano ink) is desirable. The picture excellent in scuff resistance is realizable by adding the water-soluble emulsion same to other ink constituents as the above especially. Furthermore, it is also possible to print yellow ink, Magenta ink, and cyano ink in piles, to form a black picture and to print combining the black ink by this invention. As printing method in that case, the method (desirable to the record medium which has especially a gloss layer) of piling both up, and the method (a line is formed with the method of arranging both the picture field of a certain width of face in by turns and both the ink constituent, and all of a method that put it in order are included) of forming both picture by turns are mentioned.

[0063] Like the ink constituent by this invention, in ink with comparatively many amounts of solids, such as a pigment, it breathes out for a long time, and twists, and the phenomenon in which printing is confused that ink dries and it is easy to thicken in the front face of a nozzle tends to come out of a nozzle. Then, by breathing out and twisting ink in the front face of a nozzle, and making a grade move slightly, ink is \*\*\*\*(ed) and the regurgitation of ink can be

performed stably. It is generable by ink's breathing out and twisting the pressurization means which carries out the regurgitation of the ink as the jogging method, and carrying out pressurization control at a grade. When performing such control, it is desirable to use an electrostriction element as a pressurization means because of the ease of the control. Moreover, since pigment concentration in ink can be made [ many ] by using this mechanism, it enables the depth of shade to carry out the regurgitation of the ink stably high moreover in pigment ink.

[0064] Moreover, when performing the above-mentioned jogging in a nozzle side in an ink-jet recording device, the content of a pigment is effective to the ink constituent which is 5% – about 15 % of the weight, and is 7% – about 10% of the weight of an ink constituent more preferably.

[0065] Moreover, the ink constituent by this invention may be filled up with a polyurethane foam, and the ink tank made into the structure where an urethane foam touches ink may be filled up with it, and it may be ~~used~~ by use. In this case, if it uses for an urethane foam by this invention, the surfactant of the glycol ethers made good and an acetylene glycol system will adsorb.

Therefore, in consideration of the amount adsorbed, it adds superfluously, and Lycium chinense is good. Moreover, by using the ink constituent by this invention, an urethane foam can secure negative pressure, moreover it is decomposed by each component of the ink used by this invention, or it generates a foreign matter, and has few the factors and bird clappers of blinding. The thing containing a metal salt or a cation system does not use for the curing catalyst of this urethane foam. About [ a polyfunctional isocyanate and average molecular weight 300, such as tolylene diisocyanate and meta-xylylene diisocyanate, to ] 3000 polypropylene glycol, Glycols, such as a polyethylene glycol, a glycerol, a pentaerythritol, Dipentaerythritol, neopentyl glycol, a propylene glycol, It is desirable from the negative pressure reservation by the stability of a form configuration, and a viewpoint of chemical stability to use the urethane foam which consists of matter which has two or more hydroxy groups, such as 1, 3-butanediol, 1, 4-butanediol, 1, and 5-pentenediol.

[0066]

[Example] Although the following examples explain this invention in detail below, this invention is not limited to these.

[0067] The ink constituent of the composition shown below was prepared.

[0068] The water-soluble pigment obtained with the application of the method of a publication to the pigment with which the notation with a denaturation object is marketed below at JP,8-34981,A is meant.

[0069] Moreover, the mean particle diameter of a water-soluble pigment was shown per nm in the parenthesis.

[0070] Emulsion A-D furthermore used in the following examples was prepared as follows.

[0071] Emulsion A: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the glycidoxy acrylate 4 section, the styrene 5 section, the tetrahydrofurfuryl acrylate 6 section, the butyl acrylate 5 section, and the t-dodecyl mercaptan 0.02 in the ion-exchange-water 7 section was made to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 30 section, the butyl methacrylate 15 section, the butyl acrylate 16 section, the acrylic-acid 2 section, 1, and 6-hexanedioldimethacrylate 1 section and the t-dodecyl-mercaptan 0.5 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion A.

[0072] Emulsion B: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and

agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the styrene 10 section, the glycidoxy methacrylate 5 section, the butyl methacrylate 5 section, and the t-dodecyl mercaptan 0.02 in the ion-exchange-water 7 section was made to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 35 section, the butyl acrylate 25 section, the acrylic-acid 10 section, the acrylamide 1 section, and the t-dodecyl-mercaptan 0.5 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion B.

[0073] Emulsion C: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the styrene 5 section, the glycidoxy methacrylate 2 section, the benzyl methacrylate 6 section, the butyl methacrylate 10 section, and the t-dodecyl mercaptan 0.02 in the ion-exchange-water 7 section was made to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 30 section, the butyl methacrylate 15 section, the acrylic-acid 10 section, the triethanol propane trimethacrylate 1 section, 1, and 6-hexanedioldimethacrylate 1 section and the t-dodecyl-mercaptan 0.5 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion C.

[0074] Emulsion D: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The ion-exchange-water 7 section was made for the monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the styrene 15 section, the urethane prepolymer 1 section that consists of tolylene G SOSHIANEOTO 1,5-pentanediol, the butyl methacrylate 15 section, and the t-dodecyl mercaptan 0.02 to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 30 section, the acrylamide 1 section, the butyl methacrylate 15 section, the JIBENTA erythritol hexa methacrylate 1 section, and the t-dodecyl-mercaptan 0.6 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion D.

[0075] Emulsion A-D obtained as mentioned above is the following water-soluble emulsions. That is, Emulsion A has core-shell type structure, it has the structure where consisted of polymer using the acrylic acid with which the core section contains glycidide KISHIDO, and the bridge was constructed, and the shell section consists of a resin which is made to carry out the polymerization of the acrylic acid, and has the carboxyl group of an acrylic acid on a front face. Emulsion B consists of a resin with which it has core-shell type structure and has the structure

where consisted of a copolymer of the acrylic acid and methacrylic acid in which the core section contains glycidic KISHIDO, and the bridge was constructed, and the shell section carries out the polymerization of the acrylic acid, and has the carboxyl group of an acrylic acid, and the amide group of an acrylamide on a front face. Moreover, Emulsion C consists of a resin with which it has core-shell type structure and has the structure where consisted of polymer using the methacrylic acid in which the core section contains glycidic KISHIDO, and the bridge was constructed, and the shell section carries out the polymerization of an acrylic acid and the methacrylic acid, and has the carboxyl group of an acrylic acid and a methacrylic acid, and the amide group of methacrylamide on a front face. Emulsion D has core-shell type structure, and consists of mixture with the copolymer of the resin with which the core section contains a urethane bond, and a styrene and an acrylic acid, and these resins consist of a resin with which it has the structure where the bridge was constructed, and the shell section carries out the polymerization of methacrylate and the acrylamide, and has the carboxyl group of a methacrylic acid, and the amide group of an acrylamide on a front face.

[0076] Moreover, in the water of a residue, the benzotriazole was added for preventing the corrosion of the member of an ink-jet formula recording head for the corrosion prevention of ink.

[0077]

Example 1 Addition (% of the weight)

MA100 (Mitsubishi Chemical make) denaturation object 6.0 SAFI Norian 465 1.2 Emulsion A 3.0 Glycerol 15.0 Diethylene glycol 5.0 2-pyrrolidone 5.0 Thiodiglycol 3.0 Triethanolamine 0.8 Potassium hydroxide 0.1 Ion exchange water Residue [0078]

Example 2 MA600 (Mitsubishi Chemical make) denaturation object (135) 7.5 SAFI Norian 104 0.1 SAFI Norian 465 1.9 Emulsion B 5.0 Glycerol 12.0 2-pyrrolidone 20.0 Thiodiglycol 4.0 Triethanolamine 3.0 Potassium hydroxide 0.1 Ion exchange water Residue [0079]

Example 3 Color Black FW18 (product made from TEGUSA) denaturation object (120) 15.0 SAFI Norian TG 0.2 SAFI Norian 465 1.0 Emulsion C 3.0 Glycerol 7.0 Diethylene glycol 3.0 2-pyrrolidone 1.0 1,5-pentanediol 5.0 Triethanolamine 0.5 Potassium hydroxide 0.2 Ion exchange water Residue [0080]

Example 4 Micro jet CW 1 (50) 7.0 SAFI Norian 104 0.2 SAFI Norian 465 1.2 Emulsion D 2.5 1,5-pentanediol 5.0 Glycerol 15.0 Diethylene glycol 5.0 Thiodiglycol 5.0 2-pyrrolidone 1.0 Triethanolamine 2.5 Potassium hydroxide 0.01 Ion-exchange-water residue [0081]

Example 5 #55RCF (Mitsubishi Chemical make) denaturation object (200) 5.0 SAFI Norian 465 1.2 Emulsion A 2.5 Emulsion D 0.5 Glycerol 1.0 Trimethylol propane 3.0 2-pyrrolidone 15.0 Triethanolamine 0.9 Potassium hydroxide 0.05 Ion exchange water Residue [0082]

Example 6 MONARCH880 (Cabot Corp. make) denaturation object (60) 5.0 SAFI Norian 465 0.3 Emulsion B 10.0 Glycerol 15.0 2-pyrrolidone 10.0 Triethanolamine 0.5 Ammonia 2.0 Potassium hydroxide 0.1 Ion exchange water The mean particle diameter of the carbon black used in the example of comparison below a residue was as being shown in a parenthesis.

[0083]

Example 1 of comparison MA100 (Mitsubishi Chemical make) (90) 5.0 TORIECHIEREN glycol The monomethyl ether 10.0 Ethylene glycol 8.0 Dispersant 3.0 Diethylene glycol Monomethyl ether 7.0 Ion exchange water Residue [0084]

Example 2 of comparison Color Black FW18 (Degussa AG make) (120) 5.5 Glycerol 10.0 Diethylene glycol 10.0 2-pyrrolidone 5.0 Dispersant 3.5 Ion exchange water Residue [0085]

Example 3 of comparison MONARCH880 (Cabot Corp. make) (110) 5.5 Diethylene glycol 10.0 SAFI Norian 465 1.0 Dispersant 2.5 Ion exchange water Residue [0086] Ink jet printer MJ[ by SEIKO EPSON incorporated company ]-930C was filled up with the ink constituent of the printing evaluation examination above, and the picture was formed on the record medium. The used record medium is Conqueror paper, Favorit paper, and Modo. Copy paper, RapidCopy paper, EPSON EPP paper, Xerox 4024 paper, Xerox10 paper, Neenha Bond paper, Ricopy 6200 paper, \*\*\*\*\*, Xerox It is what applied the resin on the polyester sheet as R paper, the PUKUTORIKO type record medium to which the silica sol was applied by the row on polyester JITO as glossy paper 1, and glossy paper B. Colloidal silica of 500nm of mean particle diameters

is applied in the paper as the swollen type record medium made to swell ink and glossy paper C, and a latex is applied as a binder.

[0087] The quality of printed character of the acquired picture, \*\*\*\*\*, and water resistance were evaluated as follows.

[0088] Bleeding of a printing object which carried out quality-of-printed-character dryness was judged by the following error criterion.

Evaluation A: There is almost no bleeding.

Evaluation B: Although bleeding is observed a little, it is the range permitted practically.

Evaluation C: Bleeding is observed and degrade a picture.

Evaluation D: A picture is extremely inferior with bleeding.

[0089] The printing object which carried out \*\*\*\*\* dryness was ground using the yellow water fluorescence pen (zebra company make, ZEBRA PEN2), and the dirt condition of a printing object was investigated.

[0090] The result was judged by the following error criterion.

Evaluation A: Even if it rubs two or more times, a color does not fall.

Even if it rubs B:1 evaluation, a color does not fall.

If it rubs C:1 evaluation, a color will fall a little.

If it rubs D:1 evaluation, a color will fall.

[0091] Pure water was hung down to the printing object which carried out waterproof dryness, and the trace of the waterdrop of the printing object of 1 minute after was investigated. The result was judged by the following error criterion.

Evaluation A: Marks do not remain at all.

Evaluation B: Marks hardly remain.

Evaluation C: Marks remain for a while.

Evaluation D: The remains of remarkable remain.

[0092] The above result was as being indicated in the next table.

[0093]

[Table 1]

第 1 表

実施例 インク 記録媒体	印 字 品 質						指 触 性						耐 水 性					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Conqueror	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Favorit	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Modo Copy	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Rapid Copy	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
EPSON EPP	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox 4024	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox 10	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Neenha Bond	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ricopy 6200	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Yamayuri	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox E	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
光沢紙 A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B
光沢紙 B	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B
光沢紙 C	A	A	A	A	A	A	B	B	B	B	B	B	A	A	A	A	A	A

[0094]

[Table 2]

第 2 表

比較例 インク 記録媒体	印 字 品 質			指 触 性			耐 水 性		
	1	2	3	1	2	3	1	2	3
Conqueror	B	B	B	C	C	C	B	B	B
Favorit	B	B	B	C	C	C	B	B	B
Modo Copy	B	B	B	C	C	C	B	B	B
Rapid Copy	B	B	B	C	C	C	B	B	B
EPSON EPP	B	B	B	C	C	C	B	B	B
Xerox P	B	B	B	C	C	C	B	B	B
Xerox 4024	B	B	B	C	C	C	B	B	B
Xerox 10	B	B	B	C	C	C	B	B	B
Neenha Bond	B	B	B	C	C	C	B	B	B
Ricopy 6200	B	B	B	C	C	C	B	B	B
Yamayuri	B	B	B	C	C	C	B	B	B
Xerox R	B	B	B	C	C	C	B	B	B
光沢紙 A	A	A	A	D	D	D	D	D	D
光沢紙 B	A	A	A	D	D	D	D	D	D
光沢紙 C	A	A	A	D	D	D	C	C	C

[Translation done.]



\* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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EXAMPLE

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[Example] Although the following examples explain this invention in detail below, this invention is not limited to these.

[0067] The ink constituent of the composition shown below was prepared.

[0068] The water-soluble pigment obtained with the application of the method of a publication to the pigment with which the notation with a denaturation object is marketed below at JP,8-34981,A is meant.

[0069] Moreover, the mean particle diameter of a water-soluble pigment was shown per nm in the parenthesis.

[0070] Emulsion A-D furthermore used in the following examples was prepared as follows.

[0071] Emulsion A: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the glycidooxy acrylate 4 section, the styrene 5 section, the tetrahydrofurfuryl acrylate 6 section, the butyl acrylate 5 section, and the t-dodecyl mercaptan 0.02 in the ion-exchange-water 7 section was made to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 30 section, the butyl methacrylate 15 section, the butyl acrylate 16 section, the acrylic-acid 2 section, 1, and 6-hexanedioldimethacrylate 1 section and the t-dodecyl-mercaptan 0.5 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion A.

[0072] Emulsion B: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the styrene 10 section, the glycidooxy methacrylate 5 section, the butyl methacrylate 5 section, and the t-dodecyl mercaptan 0.02 in the ion-exchange-water 7 section was made to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 35 section, the butyl acrylate 25 section, the acrylic-acid 10 section, the acrylamide 1 section, and the t-dodecyl-mercaptan 0.5 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as

#### Emulsion B.

[0073] Emulsion C: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the styrene 5 section, the glycidoxy methacrylate 2 section, the benzyl methacrylate 6 section, the butyl methacrylate 10 section, and the t-dodecyl mercaptan 0.02 in the ion-exchange-water 7 section was made to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 30 section, the butyl methacrylate 15 section, the acrylic-acid 10 section, the triethanol propane trimethacrylate 1 section, 1, and 6-hexanedioldimethacrylate 1 section and the t-dodecyl-mercaptan 0.5 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion C.

[0074] Emulsion D: The 0.2 sections were added for the persulfuric-acid potash of a polymerization initiator at 70 degrees C of nitrogen-gas-atmosphere mind, putting in and agitating the ion-exchange-water 100 section in dropping equipment, a thermometer, a water cooling type reflux capacitor, and the reaction container equipped with the agitator. The ion-exchange-water 7 section was made for the monomer solution which mixed and obtained the sodium-lauryl-sulfate 0.05 section, the styrene 15 section, the urethane prepolymer 1 section that consists of tolylene G SOSHIANEOTO 1,5-pentanediol, the butyl methacrylate 15 section, and the t-dodecyl mercaptan 0.02 to trickle and react to a container at 70 degrees C, and the primary matter was created. To this primary matter, the 10% solution 2 of ammonium persulfates section was added and agitated. Polymerization reaction was added and carried out to the reaction container, stirring the reaction mixture which furthermore consists of the ion-exchange-water 30 section, the lauryl potassium-sulfate 0.2 section, the styrene 30 section, the acrylamide 1 section, the butyl methacrylate 15 section, the JIBENTA erythritol hexa methacrylate 1 section, and the t-dodecyl-mercaptan 0.6 section at 70 degrees C. Reaction mixture was neutralized with ammonia after that, and it was referred to as pH 8-8.5, and it filtered with the 0.3-micrometer filter, macromolecule particle solution was obtained, and it considered as Emulsion D.

[0075] Emulsion A-D obtained as mentioned above is the following water-soluble emulsions. That is, Emulsion A has core-shell type structure, it has the structure where consisted of polymer using the acrylic acid with which the core section contains glycide KISHIDO, and the bridge was constructed, and the shell section consists of a resin which is made to carry out the polymerization of the acrylic acid, and has the carboxyl group of an acrylic acid on a front face. Emulsion B consists of a resin with which it has core-shell type structure and has the structure where consisted of a copolymer of the acrylic acid and methacrylic acid in which the core section contains glycide KISHIDO, and the bridge was constructed, and the shell section carries out the polymerization of the acrylic acid, and has the carboxyl group of an acrylic acid, and the amide group of an acrylamide on a front face. Moreover, Emulsion C consists of a resin with which it has core-shell type structure and has the structure where consisted of polymer using the methacrylic acid in which the core section contains glycide KISHIDO, and the bridge was constructed, and the shell section carries out the polymerization of an acrylic acid and the methacrylic acid, and has the carboxyl group of an acrylic acid and a methacrylic acid, and the amide group of methacrylamide on a front face. Emulsion D has core-shell type structure, and consists of mixture with the copolymer of the resin with which the core section contains a urethane bond, and a styrene and an acrylic acid, and these resins consist of a resin with which it has the structure where the bridge was constructed, and the shell section carries out the polymerization of methacrylate and the acrylamide, and has the carboxyl group of a methacrylic

acid, and the amide group of an acrylamide on a front face.

[0076] Moreover, in the water of a residue, the benzotriazol was added for pro cheating-on-the-fare XL-2 0.05% from 0.001 0.1 to 1% for the corrosion prevention of the member of an ink-jet formula recording head for the corrosion prevention of ink.

[0077]

Example 1 Addition (% of the weight)

MA100 (Mitsubishi Chemical make) denaturation object . 6.0 SAFI Norian 465 1.2 Emulsion A 3.0 Glycerol 15.0 Diethylene glycol 5.0 2-pyrrolidone 5.0 Thiodiglycol 3.0 Triethanolamine 0.8 Potassium hydroxide 0.1 Ion exchange water Residue. [0078]

Example 2 MA600 (Mitsubishi Chemical make) denaturation object (135). 7.5 SAFI Norian 104 0.1 SAFI Norian 465 1.9 Emulsion B 5.0 Glycerol 12.0 2-pyrrolidone 20.0 Thiodiglycol 4.0 Triethanolamine 3.0 Potassium hydroxide 0.1 Ion exchange water Residue. [0079]

Example 3 Color Black FW18 (product made from TEGUSA) denaturation object (120). 15.0 SAFI Norian TG 0.2 SAFI Norian 465 1.0 Emulsion C 3.0 Glycerol 7.0 Diethylene glycol 3.0 2-pyrrolidone 1.0 1,5-pentanediol 5.0 Triethanolamine 0.5 Potassium hydroxide 0.2 Ion exchange water Residue. [0080]

Example 4 Micro jet CW 1 (50) . 7.0 SAFI Norian 104 0.2 SAFI Norian 465 1.2 Emulsion D 2.5 1,5-pentanediol 5.0 Glycerol 15.0 Diethylene glycol 5.0 Thiodiglycol 5.0 2-pyrrolidone 1.0 Triethanolamine 2.5 Potassium hydroxide 0.01 Ion-exchange-water residue. [0081]

Example 5 #55RCF (Mitsubishi Chemical make) denaturation object (200). 5.0 SAFI Norian 465 1.2 Emulsion A 2.5 Emulsion D 0.5 Glycerol 1.0 Trimethylol propane 3.0 2-pyrrolidone 15.0 Triethanolamine 0.9 Potassium hydroxide 0.05 Ion exchange water Residue. [0082]

Example 6 MONARCH880 (Cabot Corp. make) denaturation object (60) 5.0 SAFI Norian 465 0.3 Emulsion B 10.0 Glycerol 15.0 2-pyrrolidone 10.0 Triethanolamine 0.5 Ammonia 2.0 Potassium hydroxide 0.1 Ion exchange water Set for the example of comparison below a residue. The mean particle diameter of the used carbon black was as being shown in a parenthesis.

[0083]

Example 1 of comparison MA100 (Mitsubishi Chemical make) (90) . 5.0 TORIECHIEREN Glycol The monomethyl ether 10.0 Ethylene glycol 8.0 Dispersant 3.0 Diethylene glycol Monomethyl ether 7.0 Ion exchange water Residue. [0084]

Example 2 of comparison Color Black FW18 (Degussa AG make) (120). 5.5 Glycerol 10.0 Diethylene glycol 10.0 2-pyrrolidone 5.0 Dispersant 3.5 Ion exchange water Residue. [0085]

Example 3 of comparison MONARK880 (Cabot Corp. make) (110). 5.5 Diethylene glycol 10.0 SAFI Norian 465 1.0 Dispersant 2.5 Ion exchange water Residue. [0086] Ink jet printer MJ[ by SEIKO EPSON incorporated company ]-930C was filled up with the ink constituent of the printing evaluation examination above, and the picture was formed on the record medium. The used record medium is Conqueror paper, Favorit paper, and Modo. Copy paper, RapidCopy paper, EPSON EPP paper, Xerox 4024 paper, Xerox10 paper, Neenha Bond paper, Ricopy 6200 paper, \*\*\*\*\*, Xerox It is what applied the resin on the polyester sheet as R paper, the PUKUTORIKO type record medium to which the silica sol was applied by the row on polyester JITO as glossy paper 1, and glossy paper B. Colloidal silica of 500nm of mean particle diameters is applied in the paper as the swollen type record medium made to swell ink and glossy paper C, and a latex is applied as a binder.

[0087] The quality of printed character of the acquired picture, \*\*\*\*\*, and water resistance were evaluated as follows.

[0088] Bleeding of a printing object which carried out quality-of-printed-character dryness was judged by the following error criterion.

Evaluation A: There is almost no bleeding.

Evaluation B: Although bleeding is observed a little, it is the range permitted practically.

Evaluation C: Bleeding is observed and degrade a picture.

Evaluation D: A picture is extremely inferior with bleeding.

[0089] The printing object which carried out \*\*\*\*\* dryness was ground using the yellow aqueosity fluorescence pen (zebra company make, ZEBRA PEN2), and the dirt condition of a printing object was investigated.

[0090] The result was judged by the following error criterion.

Evaluation A: Even if it rubs two or more times, a color does not fall.

Even if it rubs B:1 evaluation, a color does not fall.

If it rubs C:1 evaluation, a color will fall a little.

If it rubs D:1 evaluation, a color will fall.

[0091] Pure water was hung down to the printing object which carried out waterproof dryness, and the trace of the waterdrop of the printing object of 1 minute after was investigated. The result was judged by the following error criterion.

Evaluation A: Marks do not remain at all.

Evaluation B: Marks hardly remain.

Evaluation C: Marks remain for a while.

Evaluation D: The remains of remarkable remain.

[0092] The above result was as being indicated in the next table.

[0093]

[Table 1]

第 1 表

実施例 インク 記録媒体	印 字 品 質						指 触 性						耐 水 性					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Conqueror	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Favorit	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Modo Copy	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Rapid Copy	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
EPSON EPP	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox 4024	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox 10	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Neenha Bond	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ricopy 6200	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Yamayuri	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Xerox R	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
光沢紙A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B
光沢紙B	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B
光沢紙C	A	A	A	A	A	A	B	B	B	B	B	B	A	A	A	A	A	A

[0094]

[Table 2]

第 2 表

比較例 インク 記録媒体	印 字 品 質			指 触 性			耐 水 性		
	1	2	3	1	2	3	1	2	3
Conqueror	B	B	B	C	C	C	B	B	B
Favorit	B	B	B	C	C	C	B	B	B
Modo Copy	B	B	B	C	C	C	B	B	B
Rapid Copy	B	B	B	C	C	C	B	B	B
EPSON EPP	B	B	B	C	C	C	B	B	B
Xerox P	B	B	B	C	C	C	B	B	B
Xerox 4024	B	B	B	C	C	C	B	B	B
Xerox 10	B	B	B	C	C	C	B	B	B
Neenha Bond	B	B	B	C	C	C	B	B	B
Ricopy 6200	B	B	B	C	C	C	B	B	B
Yamayuri	B	B	B	C	C	C	B	B	B
Xerox R	B	B	B	C	C	C	B	B	B
光沢紙A	A	A	A	D	D	D	D	D	D
光沢紙B	A	A	A	D	D	D	D	D	D
光沢紙C	A	A	A	D	D	D	C	C	C

[Translation done.]

**\* NOTICES \***

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] The perspective diagram of the principal part of the ink-jet recording device for which the ink constituent by this invention is used preferably.

[Drawing 2] The main cross section for explaining one example of the ink-jet recording device of drawing 1 .

[Drawing 3] The decomposition perspective diagram of the principal part of the ink tank used for the ink-jet recording device of drawing 1 .

[Description of Notations]

3 Recording Head

6 Reaction \*\*\*\*

6a Form

7 Ink Tank

9 Run Through-hole

9a Air hole

20 Record Medium

21 Closure -- Member

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[Translation done.]

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**CORRECTION or AMENDMENT**

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[Procedure amendment 1]

[Document to be Amended] Specification.

[Item(s) to be Amended] Claim.

[Method of Amendment] Change.

[Proposed Amendment]

[Claim(s)]

[Claim 1] The ink constituent whose aforementioned surfactant the aforementioned pigment is a pigment in which distribution and/or the dissolution are possible without a dispersant at water coming [ a pigment, the water-soluble organic solvent, a surfactant, and water ] at least, and is an acetylene glycol system surfactant.

[Claim 2] The ink constituent according to claim 1 by which the aforementioned pigment is made without a dispersant at water the thing in which distribution and/or the dissolution are possible with surface treatment on the front face so that at least a kind of functional group or its salt of a carbonyl group, a carboxyl group, a hydroxyl, or a sulfone machine may join together.

[Claim 3] The ink constituent according to claim 1 or 2 with which the aforementioned pigment makes carbon black a principal component.

[Claim 4] An ink constituent given in any 1 term of claims 1-3 whose aforementioned pigment is what has 50-200nm of mean particle diameters.

[Claim 5] An ink constituent given in any 1 term of the claims 1-4 which come to contain the aforementioned pigment two to 10% of the weight.

[Claim 6] An ink constituent given in any 1 term of the claims 1-5 which come to contain the



forementioned acetylene glycol system surfactant 0.3 to 2.0% of the weight.

[Claim 7] An ink constituent given in any 1 term of the claims 1-6 which come to contain a water-soluble emulsion further.

[Claim 8] The ink constituent according to claim 7 which is the thing in which the aforementioned water-soluble emulsion comes to contain the resin which makes an acrylic acid and/or a methacrylic acid a principal component.

[Claim 9] An ink constituent given in any 1 term of claims 1-8 which is the thing which comes to contain the resin particle of the core-shell type structure where the aforementioned water-soluble emulsion consists of the core section and the shell section which surround it.

[Claim 10] The ink constituent according to claim 9 which the aforementioned core section consists of an epoxy resin, a urethane resin, an acrylic acid resin, and/or a methacrylic resin, and consists of a resin which has the front face where the shell section has the carboxyl group of an acrylic acid and/or a methacrylic acid.

[Claim 11] The ink constituent according to claim 9 or 10 whose resin of the core section is what has the structure of cross linkage.

[Claim 12] An ink constituent given in any 1 term of claims 1-11 whose aforementioned water-soluble organic solvent is a kind or two or more things which are chosen from a glycerol, a diethylene glycol, 1, 5-pentanediol, and the group that consists of a thiodiglycol.

[Claim 13] An ink constituent given in any 1 term of the claims 1-12 which come to contain 2-pyrrolidone further.

[Claim 14] An ink constituent given in any 1 term of the claims 1-13 which come to contain a triethanolamine further.

[Claim 15] An ink constituent given in any 1 term of claims 1-14 whose pH is 7-11.

[Claim 16] An ink constituent given in any 1 term of the claims 1-15 which come to contain a potassium hydroxide further.

[Claim 17] The method are the record method of making an ink constituent adhering and printing to a record medium, and using an ink constituent given [ as an ink constituent ] in any 1 term of claims 1-16.

[Claim 18] The ink-jet record method are the ink-jet record method of breathing out the drop of an ink constituent and printing by making this drop adhering to a record medium, and using an ink constituent given [ as an ink constituent ] in any 1 term of claims 1-16.

[Claim 19] The record object in which record was performed by the method according to claim 17 or 18.

[Claim 20] The ink-jet recording device to which it is the ink-jet recording device which comes at least to have the ink-jet formula recording head equipped with nozzle opening which carries out the regurgitation of the ink drop on the record medium, an ink container, and an ink supply means for supplying an ink constituent to the aforementioned recording head from this ink container, and the aforementioned ink container comes to contain the ink constituent of a publication in any 1 term of claims 1-16.

[Claim 21] The ink-jet recording device according to claim 20 to which the aforementioned ink container comes to have an urethane foam into it.

[Claim 22] The ink-jet recording device according to claim 20 or 21 whose nozzle side of the aforementioned recording head is the thing it comes to give eutectoid plating with a polytetrafluoroethylene and a metal to.

[Claim 23] An ink-jet recording device given in any 1 term of the claims 20-22 which are further equipped with the means which carries out the regurgitation of the color ink constituent, and come to have a means to print the aforementioned color ink constituent and to print the ink constituent of a publication on it at any 1 term of claims 1-16 when printing to the record medium which has an ink absorbing layer.

[Translation done.]